BRITISH 11.090 OF May 11 — 1909

A.D. 1909. MAY 11. No. 11,090.

GEOGHEGAN & *another's* COMPLETE SPECIFICATION.

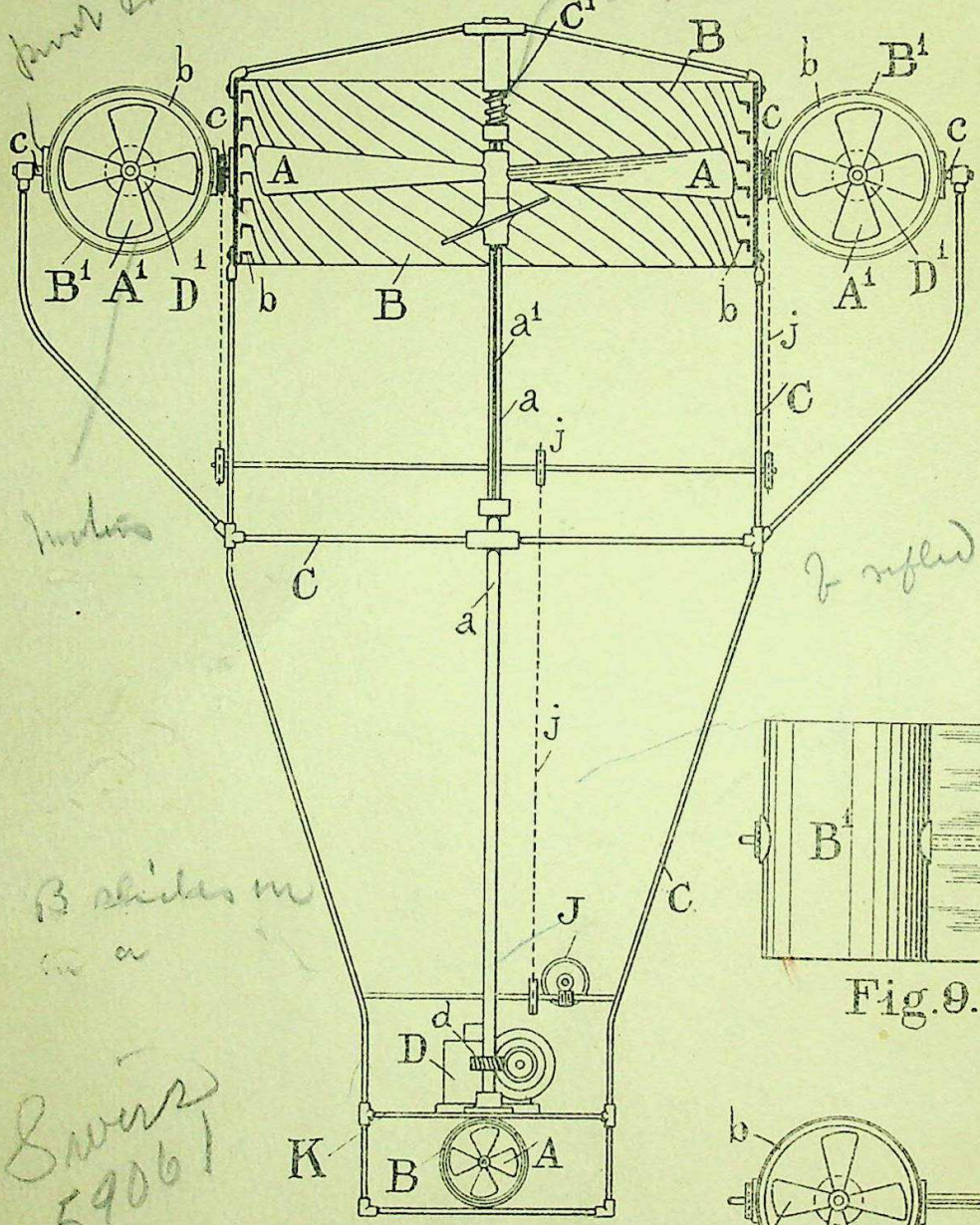

Fig.1.

Fig.9.

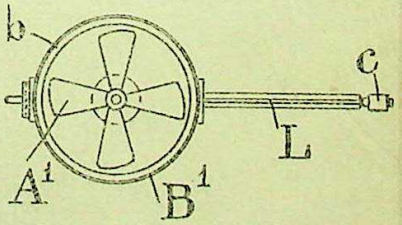

Fig.10.

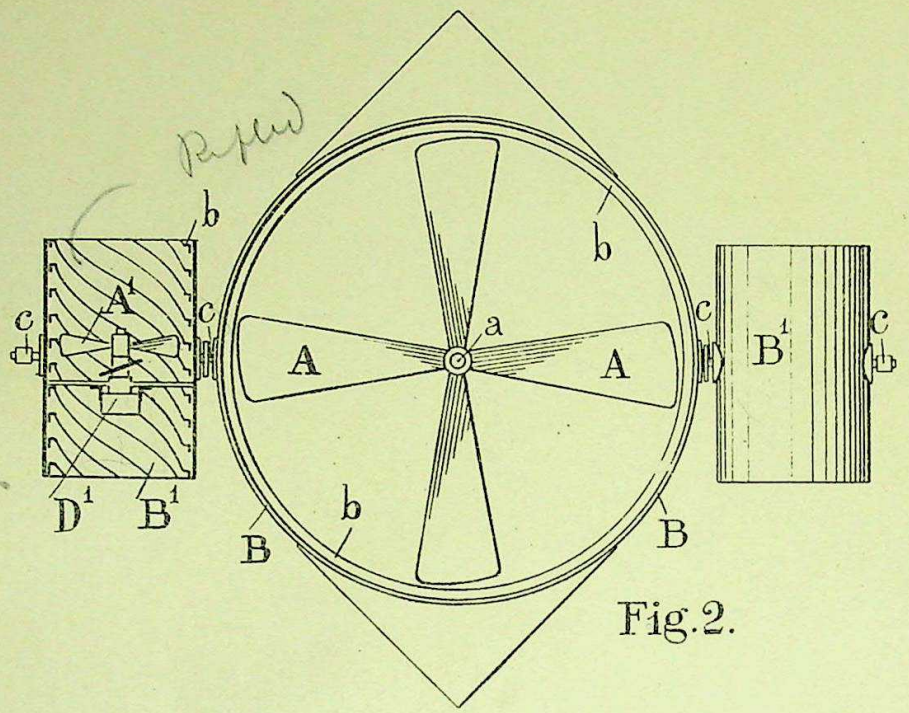

Fig. 2.

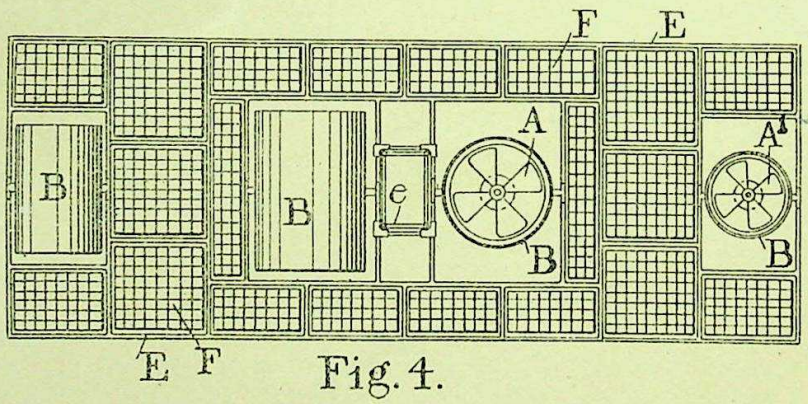

Fig. 4.

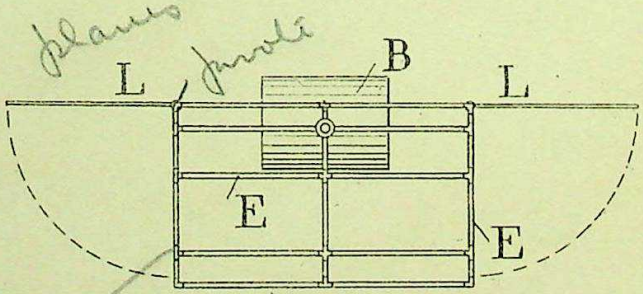

Fig. 11.

Malby&Sons Photo-Litho.

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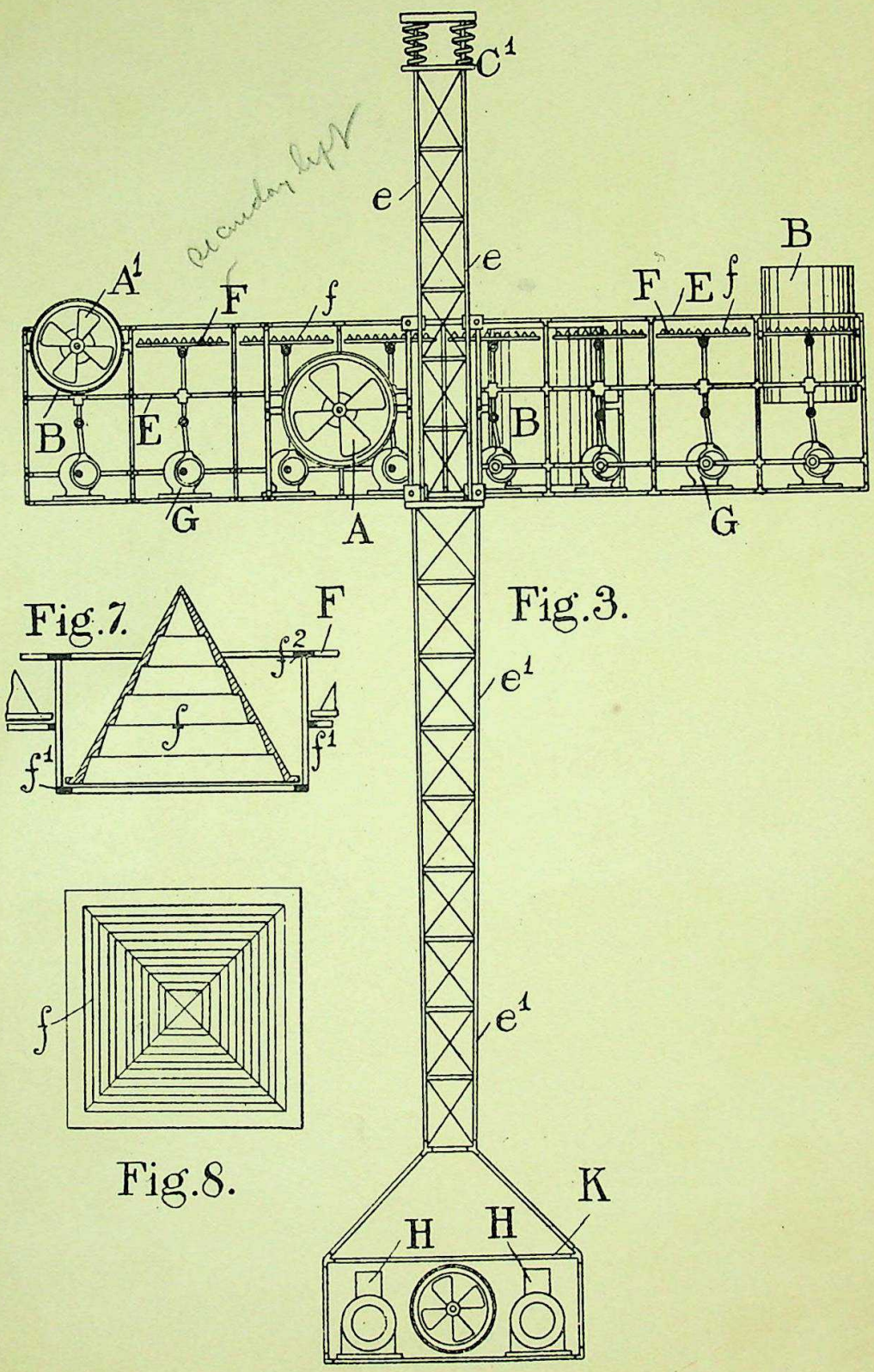

Fig.3.

Fig.7.

Fig.8.

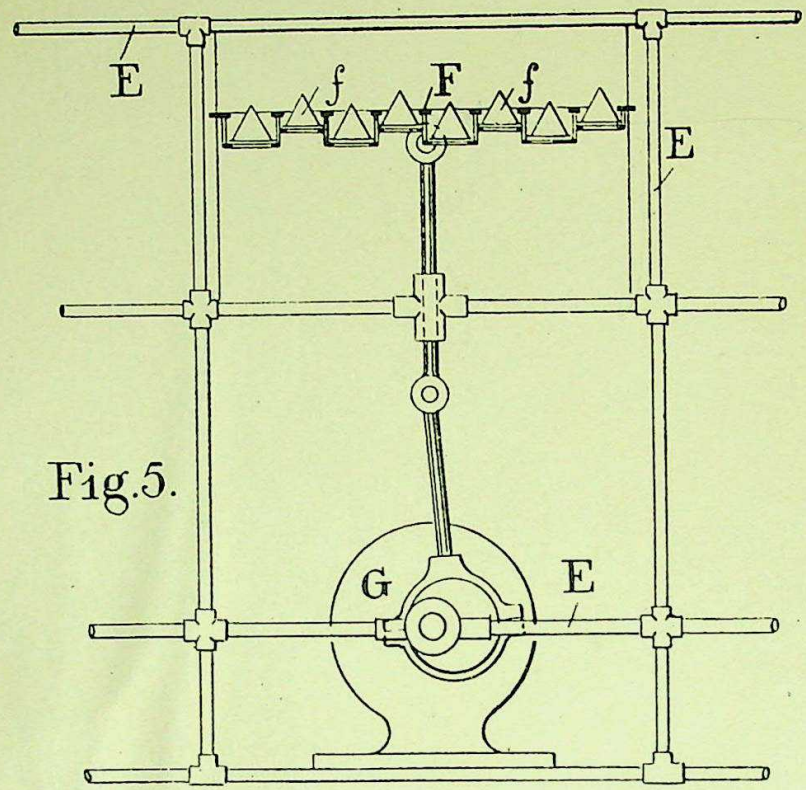

Fig.5.

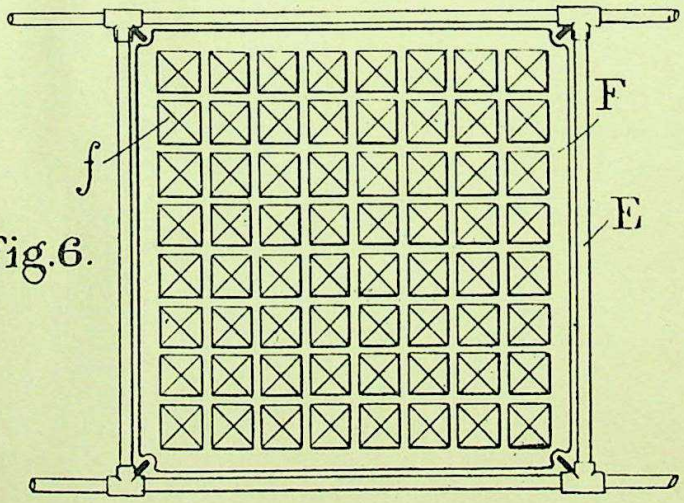

Fig.6.

Malby&Sons, Photo-Litho.

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N° 11,090 A.D. 1909

Date of Application, 11th May, 1909
Complete Specification Left, 11th Nov., 1909—Accepted, 11th Aug., 1910

PROVISIONAL SPECIFICATION.

Improvements in Apparatus for Aerial Navigation.

We, EDWARD ARTHUR GEOGHEGAN, of Cross Street, Manchester, in the County of Lancaster, Engineer, and GEORGE MATTHEWS LINDSAY MOORE-IRVINE, of the same address, Major, retired, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in apparatus for aerial navigation and is designed to provide an improved means for accomplishing same.

It consists essentially of one or more lifting screws or propellers mounted in or at the extremity of a corresponding number of open ended cylinders rifled internally said screw or screws being mounted so as to slide vertically on the driving shaft or shafts so that when motion is first imparted to a screw it slides upwards on its shaft only having to lift its own weight subsequently taking the whole weight of the apparatus only when it is rotating at good speed and has slid to the top of the shaft, with or without supplementary lifting means also preferably capable at the commencement of motion of sliding vertically on vertical support or supports consisting of a series of air valves mounted in a suitable framework and adapted to be reciprocated vertically, said valves offering little resistance to the air on the upward movement but offering full resistance to it when moving downwards, and one or more screws or propellers for propelling, and manœuvring the apparatus preferably arranged in or at the ends of rifled cylinders normally arranged horizontally but which are mounted on pivots or swivels so that they may be directed in any way desired for manœuvring or to assist the lifting effort.

In carrying out the invention in its simplest form a screw propeller of large diameter is mounted in a tubular casing which is rifled on its inner walls. The propeller is made to revolve by means of a vertical shaft on which is fixed a feathered key, and the boss, hub or centre piece of the screw propeller is arranged to have a vertically free motion or movement on the vertical shaft so that when first put in motion its vertical ascent is in no way retarded the only resistance to overcome being the mere weight of the propeller itself. The ascending or vertical velocity is thus considerable before the weight of the main structure acts on the revolving main screw air propeller. A spring or other buffer is preferably arranged against which the propeller engages as it rises so that it takes the weight of the apparatus gradually.

From the main tubular rifled casing which contains the main screw air propeller depend rigid or flexible stays or supports, to which are fixed the car or platform. Upon the car or platform are arranged the main motive power generator. The power generator may be of any type and motion may be transmitted to the propeller direct through suitable gearing or the power generator may be employed to drive a dynamo and an electric motor may be arranged to drive the propeller.

To the main tubular rifled casing are attached preferably at opposite points on its outer side horizontal rifled tubes which are fixed to pivots or swivels, to allow of their being elevated or depressed, and which contain the screw air propellers used for forward and backward or ahead and astern motion or progress, and for

ascending and descending in diagonal or oblique directions, and for reversing, steering, and circling or manœuvring purposes, or to assist the lifting effort.

These propellers are preferably driven by electric motors operated through variable speed controlling switches.

The distance from the main tubular rifled casing to platform or car containing motive power and generating machinery is preferably slightly greater than the greatest diameter over main tubular rifled casing, and the weight of the motive power generating machinery and platform is preferably in excess of that of the remainder of the structure, so that absolute, positive and automatic balance is secured.

The speed or velocity of the main screw air propeller may be regulated by a friction clutch but is preferably regulated through an electric motor by a variable speed controlling switch.

One or more such lifting units may be adapted to support and be driven from one car or platform.

In a modified arrangement two or more lifting propellers arranged in rifled cylinders as above described may be mounted in a suitable framework supported from the car on one or more supports, the whole framework being made capable of lifting thereon when motion is first imparted thereto. Such framework may take the form of a plane and some or all of the propellers may be made to swivel with their cylinders so as to aid in driving the apparatus forward when it has been lifted sufficiently high above the ground.

Or the plane may be an open framework divided into sections each section being provided with a plate capable of receiving vertical reciprocatory movement, the plate being formed with a number of air valves adapted when the plate is lifted to allow the air to pass downwards through it freely, but when it is lowered to close and press on the air to lift the apparatus or assist in lifting it.

These plates are preferably driven independently of one another by separate electric motors or other motor arrangement operated from the car or platform.

The air valves may be of any suitable construction but preferably consist of conical or umbrella shaped valves adapted to slide downwards on guides in the plate when the latter is moved upwards to allow the air to pass and to move upwards on the guides to close the plates and prevent air passing when the plate is moved downwards. The inside of the cone or pyramid shaped valve may be serrated or otherwise shaped to increase its area.

In such an arrangement the screws and air valve arrangement may be employed together to raise the apparatus and when it is raised the screws may be employed for forward and backward motion and manœuvring or the like and the air valve arrangement for lifting or supporting in the air. Or the air valve arrangement may be alone employed for lifting and the screws for forward motion and the like.

Or the air valve frame may be independent of the lifting screws and arranged above same, the latter being mounted separately or in a separate frame below the air valve frame or *vice versa*.

One, two or a number of propellers in rifled tubes as before mentioned may also be fixed to the middle, or bottom or outer sides of the platform or car which contains the main motive power machinery, and the steering and ascent, or descent and direction may be secured or altered by varying the speed of this screw or screws, and these or any of them may be also fixed in rifled tubes which in turn may be fixed on swivels or pivots.

The distance between the main plane and the platform or car which contain and support the engines and dynamos or generating machinery is preferably more than equivalent to the total width or breadth of the main framework or plane, and the weight of the generating or motive power machinery, and the car or platform which supports it is preferably greater than the weight of the main plane and the valves and motors which are attached to it.

This arrangement secures absolute and automatic balance.

Equilibrium or balance is secured when the structure is at rest on the earth or ground, by rigid stays attached to pivots or swivels fixed at the corners or sides of the main plane, and projecting or depending towards or to the earth, or by flexible or telescopic stays with earth or ground grapnels or anchors attached, or by buffers attached to main plane framework and allowed to come in contact with the walls of buildings.

Dated this 10th day of May, 1909.

J. OWDEN O'BRIEN,
Successor to and late of W. P. Thompson & Co., of Manchester,
Patent Agents.

COMPLETE SPECIFICATION.

Improvements in Apparatus for Aerial Navigation.

We, EDWARD ARTHUR GEOGHEGAN, of Cross Street, Manchester, in the County of Lancaster, Engineer, and GEORGE MATTHEWS LINDSAY MOORE-IRVINE, of the same address, Major, retired, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to improvements in apparatus for aerial navigation and is designed to provide an improved means for accomplishing same.

It consists essentially of one or more lifting screws or propellers mounted in or at the extremity of a corresponding number of open ended cylinders rifled internally said screw or screws being preferably mounted so as to slide vertically on the driving shaft or shafts so that when motion is first imparted to a screw it slides upwards on its shaft only having to lift its own weight and subsequently taking the whole weight of the apparatus only when it is rotating at good speed and has slid to the top of the shaft, with or without supplementary lifting means also preferably capable at the commencement of motion of sliding vertically on vertical support or supports consisting of a series of air valves mounted in a suitable framework and adapted to be reciprocated vertically, said valves offering little resistance to the air on the upward movement but offering full resistance to it when moving downwards, and one or more screws or propellers for propelling, and manœuvring the apparatus preferably arranged in or at the ends of rifled cylinders normally arranged horizontally but which are mounted on pivots or swivels so that they may be directed in any way desired for manœuvring or to assist the lifting effort.

The invention will be described with reference to the accompanying drawings.

Figure 1, sectional side view of a simple form of the invention.

Figure 2, plan of same partly in section.

Figure 3, sectional side view of machine showing compound arrangement of lifting screws and reciprocating valves.

Figure 4, plan of same.

Figure 5, side view to a larger scale of one section of the subsidiary lifting valves.

Figure 6, plan of same.

Figure 7, sectional elevation of a single air valve.

Figure 8, underside plan of same.

Figures 9 and 10, detail views showing the application of planes to the arrangement shown in Figures 1 and 2.

Figure 11, end view of machine shown in Figures 3 and 4 with planes applied thereto.

In a simple form of the invention (see Figures 1 and 2) a screw propeller A of large diameter is mounted to rotate horizontally on a vertical shaft *a*. The shaft *a* is provided with one or more feathers or key ways a^1 as shown, and the boss hub or centre piece of the propeller A is provided with corresponding key ways, keys or the like, but is made so that it will slide freely longitudinally of the shaft *a* in such a manner that when first put in rotary motion it will slide vertically upwards upon the shaft *a*, its vertical ascent being in no way retarded, and the only resistance to overcome being the mere weight of the propeller A itself. The ascending or vertical velocity is thus considerable before the weight of the main structure acts on the revolving propeller. A spring or other buffer C^1 is arranged at the top of the shaft *a* against which the propeller A engages as it rises preferably in such a manner that it takes the weight of the apparatus gradually.

The propeller is arranged to rotate in or at the end of a tubular casing B, and this casing may extend the whole length of that portion of the shaft *a* upon which the propeller slides, or, as shown, it may be comparatively short and only surround the upper portion of the shaft at that portion where the propeller rotates when supporting the machine in the air.

The tubular casing B is provided with an internal rifling *b*, the object of which is to increase the amount of air which can be driven through the cylinder by a given effort and thus assisted by the whirling motion of the air to strengthen and solidify, so to speak, the column or columns of air up which the apparatus rises. We are aware that it is not novel in aerial machines to arrange propellers or screws in tubes or pipes, and also to arrange such screws and tubes containing them in pivots so that their direction can be varied, and we do not make any claim herein to such arrangements *per se*.

From the tubular casing B which contains the propeller A depend rigid or flexible stays or supports C, to which is fixed the car or platform K. Upon the car or platform K is arranged the main motive power generator D. The power generator may be of any type and motion may be transmitted to the propeller direct through suitable gearing *d*, or the power generator may be employed to drive a dynamo and an electric motor directly coupled thereto may be arranged to drive the propeller.

To the main tubular casing B are attached preferably at opposite points on its outer side other rifled tubes B^1 which are fixed to pivots or swivels *c*, to allow of the position being altered so that they may be directed horizontally vertically or at any desired inclination. These tubes are fitted with propellers A^1 which are used for forward and backward or ahead and astern motion or progress, and for ascending and descending in diagonal or oblique directions, and for reversing, steering, and circling or manœuvring purposes, or to assist the lifting effort.

The tubes B^1 containing the propellers A^1 may be varied in position about the pivots *c* in any suitable manner, for instance a hand wheel J on the car K adapted through a suitable system of chains, and chain wheels *j* to rotate the tubes may be employed for this purpose.

These propellers may be driven in any suitable manner either from the main power generator on the car K or otherwise but are preferably driven by direct coupled electric motors D^1 operated through variable speed controlling switches.

The distance from the main tubular casing B to the platform or car K containing the motive power and generating machinery is preferably slightly greater than the greatest diameter of the main tubular casing B, and the weight of the motive power generating machinery D and platform K is preferably in excess of that of the remainder of the structure, so that absolute, positive and automatic balance is secured.

The speed or velocity of the main screw air propeller may be regulated in any suitable way for instance by a friction clutch but where the propeller is driven by an electric motor which is preferable it is regulated by means of a variable speed controlling switch.

One or more such lifting units may be adapted to support and be driven from one car or platform.

In a modified arrangement two or more lifting propellers arranged in rifled cylinders as above described may be mounted in a suitable framework supported from the car on one or more vertical supports the whole framework being made capable of lifting thereon when motion is first imparted thereto in the manner above described. Such framework may take the form of a plane and some or all of the propellers may be made to swivel with their cylinders so as to aid in driving the apparatus forward when it has been lifted sufficiently high above the ground.

A simple arrangement of this nature is shown in Figures 9 and 10. The cylinders B^1 of the propellers A^1 are provided at their outer sides with planes L extending outwards. When the machine is rising and the cylinders are vertical the planes turning with the cylinders are also vertical and oppose no resistance to the upward movement. But when the machine has risen to the desired altitude for flight and the cylinders B^1 are rotated into the at any rate approximately horizontal direction the planes turn with them and form an additional support to hold the machine in the air.

When a plane or planes are employed they may be made adjustable so that their area can be increased or diminished as desired or they may be employed in conjunction with an arrangement of the type described below.

An arrangement with a secondary lifting and supporting device is shown in Figures 3 and 4 of the drawings. In this arrangement the plane consists of an open framework E divided into sections each section being provided with a plate or grid F, capable of receiving vertical reciprocatory movement. The plate F is formed with a number of air valves *f* adapted when the plate is lifted to allow the air to pass downwards between or through them freely, but when it is lowered to close and press on the air to lift the apparatus or assist propellers A and A^1 in lifting it.

These plates or grids F may be reciprocated in any suitable manner either from the main motor H on the car K or from a separate motor provided for the purpose but they are preferably driven as shown independently of one another by separate electric motors G.

The air valves may be of any suitable construction but preferably consist of conical or umbrella shaped valves *f* adapted to slide on guides between stops f^1 and f^2 in the plate or grid F when the latter is moved upwards to allow the air to pass and to move upwards on the guides to close the plates or grids F and prevent air passing when the plate is moved downwards. The inside of the cone or pyramid shaped valve *f* may be serrated as shown or otherwise shaped to increase its area presented to the air on the downward movement.

The bottom stops f^1 are staggered as shown to allow passages for the air between the valves on the upward movement of the plates or grids F.

In such an arrangement the propellers A, the cylinders of which are pivoted and made adjustable in the same manner as the subsidiary propellers A^1 shown in Figures 1 and 2 and the air valve arrangement may be employed together to raise the apparatus and when it is raised the screws may be employed for forward and backward motion and manœuvring or the like and the air valve arrangement for lifting or supporting the machine in the air or the air valve arrangement may be alone employed for lifting and the screws for forward motion and the like.

We are aware that it has been proposed to employ vertically reciprocating means containing air valves to support and raise apparatus in the air and to such broadly we make no claim herein.

Or the air valve frame may be independent of the lifting screws and arranged above same, the latter being mounted separately or in a separate frame below the air valve frame or *vice versa*.

If desired wing planes L may be hinged (as shown in Figure 11) to the side or

sides of the frame E so that when rising they hang down and offer no resistance to the ascending movement, and so that when the desired altitude is reached they may be spread out to aid in supporting the apparatus in the air, or if the speed attained is great enough they may be relied on wholly to support the machine.

The whole of the subsidiary lifting device carried by the frame E may be adapted to rise upon the stay or stays support or supports carrying the car before taking the weight thereof in a manner similar to the rising of the propellers A as described with reference to Figures 1 and 2.

For this purpose the frame E is constructed so that it can slide vertically upon the upper end *e* of the stay or support e^1 carrying the car K and a spring or other device C^1 as described with reference to Figures 1 and 2 is provided so that the weight of the car is taken up gradually by the lifting arrangements.

One, two or a number of the propellers A as before described may also be fixed to the middle, or bottom or outer sides of the platform or car which contains the main motive power machinery of any of the forms of the apparatus described, and the steering and ascent, or descent and direction may be secured or altered by varying the speed of this screw or screws, and these or any of them may be also fixed in tubes B which in turn may be fixed on swivels or pivots.

The distance between the main plane and the platform or car which contains and supports the engines and dynamos or generating machinery is preferably more than equivalent to the total width or breadth of the main framework or plane, and the weight of the generating or motive power machinery and the car or platform which supports it is preferably greater than the weight of the main plane, and the valves and motors which are attached to it.

This arrangement secures absolute and automatic balance.

Equilibrium or balance is secured when the structure is at rest on the earth or ground, by rigid stays attached to pivots or swivels fixed at the corners or sides of the main plane, and projecting or depending towards or to the earth, or by flexible or telescopic stays with earth or ground grapnels or anchors attached or by buffers attached to main plane framework and allowed to come in contact with the walls of buildings.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In apparatus for aerial navigation the combination of propellers for lifting, travelling, steering and other purposes with open ended internally rifled tubular casings in or at the end of which the propellers rotate.

2. Apparatus for aerial navigation of the type employing horizontal propellers to support the apparatus in the air constructed with open ended internally rifled tubular casings in or at one end of which the propellers are arranged to rotate when supporting the apparatus in the air, substantially as described.

3. Apparatus for aerial navigation of the type described in Claim 1 constructed with propellers arranged to rotate in or at the end of internally rifled tubular casings arranged so that they can be adjusted into a vertical horizontal or intermediate plane so that the propellers may produce at will upward, forward, inclined, circular or other movement of the apparatus substantially as described.

4. In apparatus for aerial navigation of the type described in Claim 1 mounting the supporting propeller or propellers on an approximately vertical shaft or shafts in such a manner that when rotary movement is first given to the propeller or propellers it or they are permitted to slide upwards vertically thereon against their own weight only until it or they have attained a considerable speed when they are arranged to take the whole weight of the apparatus substantially as described.

5. Apparatus for aerial navigation constructed with propellers for lifting travelling or manœuvring the apparatus which direct the air moved by them

through internally rifled tubular casings surrounding or adjacent thereto combined with subsidiary lifting apparatus or supporting planes substantially as described.

6. Apparatus for aerial navigation consisting of a main lifting propeller which may or may not be capable of sliding vertically upon its driving shaft before taking the full load of the apparatus combined with one or more other propellers adapted normally to cause the apparatus to travel which are preferably mounted on pivots so that they can be slowed into a horizontal or any other position to enable them to assist the lifting effort or to manœuvre the apparatus, and are arranged to rotate in or at the end of internally rifled tubular casings substantially as described.

7. Apparatus for aerial navigation of the type described in Claim 6 provided with planes the area of which may or may not be adjustable, adapted when the machine is being raised to offer no resistance to its ascent but when the desired altitude is reached to be utilised to assist in supporting the apparatus when moving forwards.

8. Apparatus for aerial navigation of the type described inClaims 1 to 4 having the propellers and their tubular casing, which may or may not be mounted on pivots to permit of their angle of operation being adjusted, mounted in a plane or framework adapted to support or assist in supporting the machine in the air when travelling forward with or without subsidiary planes hinged to the sides of the framework and adapted to depend therefrom while the machine is rising but which can be spread when the desired altitude is reached to assist in supporting the apparatus in the air when moving forward substantially as described.

9. Apparatus for aerial navigation of the type described in Claim 8 having a framework constructed with vertically reciprocating means containing a number of air valves arranged in such a manner that when they are moved downwards no air is allowed to pass but when moved upwards air freely passes through or between them substantially as described.

10. Apparatus for aerial navigation of the type described in Claim 9 having a framework constructed with a number of sections each section being provided with a plate or grid to which vertical reciprocating motion is given by any suitable means said plates or grids containing a number of air valves adapted to slide on guides formed in the grids in such a manner that when they are moved downwards no air is allowed to pass, but when moved upwards air freely passes through or between them substantially as described.

11. Valves for apparatus for aerial navigation of the type described in Claims 9 and 10 consisting of pyramidal, conical or similarly shaped stampings, castings or the like combined with grids or plates in which they are adapted to slide in such a manner that when moving downwards they present a closed face to the air but when moving upwards they engage stops adapted to give them a staggered position so that air is permitted to pass between them substantially as described.

12. Apparatus for aerial navigation having the several parts constructed and arranged substantially as described and shown with reference to Figures 1 and 2 and Figures 9 and 10 and Figures 3 and 4 and Figure 11 of the drawings.

13. In combination with apparatus for aerial navigation of the type described in Claim 1 an air valve arrangement substantially as described and shown with reference to Figures 5 to 8 of the drawings.

Dated this 9th day of November, 1909.

J. OWDEN O'BRIEN,
Successor to and late of W. P. Thompson & Co., of Manchester,
Patent Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1910.